

VERBAL CONDITIONING AND EXTINCTION AS A FUNCTION OF  
OPERANT LEVEL, NUMBER OF VERBAL RESPONSES, AND  
TYPE OF REINFORCEMENT

by

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Verbal conditioning commonly has been defined as the conditioning or learning of a verbal response through verbal or nonverbal reinforcement. Although research in verbal conditioning does not have a long history, much experimentation has been reported. The present interest in verbal conditioning may easily be traced to the now classic work of Greenspoon (1951), although the roots of verbal conditioning may be found in the research of Thorndike (1932), who trained subjects (Ss) to choose the correct meaning for a Spanish word from five alternative English words by means of verbal reward or punishment.

Three major review articles (Greenspoon, 1962; Krasner, 1958; and Salzinger, 1959) summarize the techniques and procedures commonly used and the independent variables investigated in verbal conditioning research. The tasks used to study verbal conditioning may be placed distinctly into three categories: (a) the sentence completion task (Taffel, 1955), (b) the free-responding situation (Greenspoon, 1951), and (c) the interview situation (Salzinger & Pisoni, 1958). Each of these, while differing in the degree of restriction placed upon the S when emitting verbal responses, has the common purpose of providing a procedure whereby S's operant level (initial rate of responding prior to conditioning) for various verbal responses may be determined. This makes it possible to reinforce selectively one or more of these responses and assess the effect of reinforcement by changes

in frequency of responding. The effect on responding of the termination of reinforcement may also be ascertained following the reinforcement trials. Among the variables which have been studied in the verbal conditioning paradigm are kinds of reinforcing stimuli (mechanical versus verbal), type of Ss (e.g., psychiatric patients versus college students), length of experimental session, experimenter-subject interactions, and schedules of reinforcement (continuous versus intermittent), to name a few.

Although perhaps for different reasons, the area of verbal conditioning has attracted the attention of both experimental and clinical psychologists. There appear to be at least two reasons for this common interest: (1) to specify the variables which play a significant role in the modification of verbal behavior and (2) to stimulate concern for a theory to unify the findings of verbal conditioning research. While theoretical formulations of verbal conditioning have been offered (Dixon & Oakes, 1965; Dulany, 1961, 1962; Spielberger, 1962; Spielberger, Levin, & Shepard, 1962; Weide, 1959) some of these seem to be of limited generality and based upon questionable methodology. The purpose of this study is to point out these methodological deficiencies, to suggest additional variables which may play a significant role in verbal conditioning, and to incorporate these into an empirical investigation.



### Controls Necessary for Determining the Effect of Reinforcement

In the typical verbal conditioning study, the experimenter (E) first determines the operant level (OL) of emission of a selected response or class of responses (e.g., self-reference pronouns: I-We), and then systematically reinforces the usage of these on subsequent conditioning trials. The effect of reinforcement (and its subsequent removal) on performance is usually ascertained by comparing the level of responding for the reinforced response(s) during conditioning with that during OL, or by comparing the level of responding during extinction with that of conditioning. Unfortunately, this type of design fails to take into account possible variations in responding across trials in the absence of reinforcement. More specifically, systematic changes in responding during conditioning (or extinction) as compared with OL may be a function of many factors besides reinforcement (e.g., fatigue, boredom, or response set). Thus, there appears to be a need for a more appropriate control, which provides a group receiving no reinforcement during all stages of the experiment. Differences in performance between such a control and a reinforcement group, which differ only in terms of reinforcement history, should provide for a more accurate measure of conditioning and extinction. This type of control has been limitedly employed in the free-responding situation (Green-spoon, 1951), but it does not appear to have been used with

the more common sentence completion task (Taffel, 1955).

Effect of Operant Level on Subsequent Conditioning and Extinction

A review of the literature reveals little research concerned directly with the effect of OL on subsequent conditioning and extinction. Several investigators have alluded to the importance of OL for verbal conditioning on reinforced and non-reinforced trials, but as yet this variable has not been systematically investigated.

The importance of OL as a variable affecting conditioning and extinction was first suggested by Hartman (1955). The procedure employed was of the variety described previously by Taffel (1955), in which Ss were verbally reinforced for beginning a sentence with a particular one of five pronouns. The to-be-reinforced pronoun was the same for all Ss. The initial purpose of the research was to discover the effect of different types of social reinforcement on normal and schizophrenic Ss during conditioning and extinction. The data gave no clear-cut evidence for verbal conditioning (or differential extinction). By looking at Hartman's data, however, it appeared as though some verbal conditioning may have taken place for Ss with an initially low OL for the reinforced pronoun. On the other hand, Ss with a medium or high OL showed little, if any, conditioning.

Additional research by Peterson (1956) showed that high cultural frequency responses were verbally conditioned

faster than low cultural frequency responses. From this study, Peterson concluded that OL differentially effected responding during conditioning. A study more directly concerned with the effect of OL on conditioning was that of Weide (1959). The Ss were instructed to make up sentences using one of three verb classes, which were initially selected so as to have different normative OLs. All three OL groups showed a significant increase in responding from OL to conditioning, but this effect was not differential across the three OL groups. Hence it was concluded that OL did not differentially effect the amount of increase in responding on reinforced trials. However, Weide's conclusions about the effect of OL on verbal conditioning may be questioned because of the relatively small differences between his initial OL groups; the mean difference between the high and low OL groups was less than three-fourths of one response per block of 20 trials. Thus, it would appear that this study did not effectively manipulate OL so as to provide for a sensitive test of its effect upon conditioning.

More recent research by Getter (1963), although not directly concerned with the effect of OL on conditioning, provides further evidence for the importance of this variable in verbal conditioning research. The technique used was a modified Taffel method in which Ss were verbally reinforced for selecting the one of two words which ended in the suffix "ion". Control Ss, who performed the same task,



received no reinforcement, but were treated as they had been during OL trials. The results showed significant conditioning (relative to the non-reinforcement control) with the low OL "ion" ending words, and little, or no, conditioning with the high OL "ion" ending words. Getter attempted to explain the failure of the high OL group to condition in terms of what might be called a "ceiling effect" in which Ss with a high OL do not have the same opportunity to increase level of responding during conditioning to the same extent as Ss with a lower OL. Other evidence for a "ceiling effect" in verbal conditioning has been reported by Matarazzo, Saslow, & Pareis (1960) in a free-responding situation. They found a negative correlation between degree of OL and amount of verbal conditioning, thus supporting the notion of a "ceiling effect". A similar but opposite effect may also exist with low OL responding. Specifically, if Ss rarely emit a response, the likelihood of conditioning such a response would be minimal. This notion is supported by the findings of Wilson & Verplanck (1956). Thus, it would appear that with relatively high and low OL responses, conditioning is unlikely to occur, and accordingly, the magnitude of high and low OL responding should be carefully examined in studies of verbal conditioning.

In a further attempt to delineate the processes in verbal conditioning, preliminary research was conducted in

this laboratory. The technique used was of the Taffel variety. The Ss were divided into three OL groups (high, medium, and low). They were instructed to construct sentences beginning with one of five pronouns, using a simple past tense verb, which was provided on the card accompanying the pronouns. After determination of OL for pronouns in a specified response class (I-We or He-They), Ss were subsequently verbally reinforced for using either the high, medium, or low OL pronouns in a particular response class. After 60 such conditioning trials, reinforcement was terminated and 60 no-reinforcement trials followed. Three OL control groups received no verbal reinforcement throughout the experiment. The results showed no significant effect of verbal reinforcement for either high, medium, or low OL groups during conditioning, although level of responding for the three OL groups was significantly different across OL and conditioning trials. During the extinction trials, the high and medium OL reinforcement groups appeared to show some decrease in responding, as compared with the controls, but the low OL group did not. These extinction results are contrary to those of Hartman (1955), who found no reduction in responding for high and medium OL groups during extinction trials. In terms of conditioning, these results were quite similar to those found by past investigators (Getter, 1963; Hartman, 1955), particularly with respect to an observed decrease in the level of responding for the high OL group over reinforcement trials.

### The Effect of Response Class on Conditioning and Extinction

The author's research raised some interesting questions about the definition of a response class. Although the importance of the nature of the response class for verbal conditioning has been recognized previously by Greenspoon (1951), by and large its specification has been left primarily to the discretion of E on a priori grounds (Auld & Murray, 1955; Greenspoon, 1951; Staats, 1961; and Weide, 1959). For example, Weide (1959) defined the to-be-reinforced response class as a group of responses which have some similar, functionally-related properties. In the case of pronouns, for example, past researchers have specified the response class in terms of singular-plural (I-He; We-They) and self-other reference (I-We; He-They). Thus, it has been usually left to E to decide which class of responses will be reinforced, without direct regard for the actual OL response tendencies of S.

Since the response class typically consists of two or more items, its overall OL necessarily reflects the mean response level of all items in the class. Such a procedure fails to account for any differences in OL between members of the response class. Thus, to the extent that some items in the to-be-reinforced response class are similar in OL to items in a non-reinforced class, it is possible to reinforce partially the usage of items in the latter class. Consequently, failure to find conditioning might be a result of this

partial reinforcement confounding. In the present study, specification of high through low OL was contingent upon S's performance during OL trials.

The purpose of the experiment to be reported here was to determine the role of OL and type of response class in verbal conditioning. In addition, the effects of fixed (same verbal reinforcer for all reinforcement) as opposed to varied (four different reinforcers) verbal reinforcement during conditioning was investigated. Further, the relative effects of no reinforcement and different reinforcement (reinforcement of a previously non-reinforced response) during extinction trials were studied. Finally, a Control group, which received no reinforcement throughout the experiment, was employed.

## METHOD

### Subjects

The Ss were 96 female students drawn from Introductory Psychology classes at Kansas State University; class credit was awarded for participation. The Ss were unsystematically assigned to one of six equal size ( $N=16$ ) basic reinforcement groups in a manner which insured that the groups were filled at the same rate.

### Stimuli

The stimulus materials consisted of a deck of 100 4 x 6 in. index cards, each with a different past tense verb typed at the top center. Eighty of the verbs were the same ones used by Taffel (1955), and an additional twenty were randomly selected from Klein (1954). These 100 verbs are listed in Appendix 1. Typed in a row at the bottom of each card were four pronouns (I, We, He, They). The order of appearance of the pronouns on each card was randomly determined.

### Procedure

Instructions and task. Each S was escorted to the experimental room by E and was engaged in conversation to acclimate her to the situation (Solly & Long, 1958). After the seating of S in the room, E read the following instructions:

You are participating in an experiment in which we are attempting to determine how people go about making up sentences. When I turn these cards over,



you will see a word in the top center of each card. For each card, I want you to look at the word in the top center of the card, and then make up a sentence using that word in it. At the bottom of each card, there also will be some other words. Look them over and then choose one of them to start the sentence.

It doesn't matter whether the sentence you make up is long or short or even if it is complicated or simple. It is important that you answer with the first sentence that you think of.

It may not be easy at first, but you will find that if you try to answer as quickly as possible, you are more likely to give the first thing you think of.

Once the experiment begins, the cards will be presented here (E indicated the opening in the screen). If you finish sooner simply wait for the next card. Let's try some of these for practice. Any questions?

From now on, if you have any questions, wait until the experiment is completely finished before you ask them. I will be unable to answer any questions after we start. Okay? We'll be ready to begin in a few seconds.

After the instructions were read, E sat behind a 3 x 5 ft. black screen for the duration of the experimental task. Stimulus cards were presented one at a time to S through a 4 x 6 in. opening at the bottom of the screen.

Design. The experiment consisted of three parts: OL, conditioning, and extinction with each S serving under each part.

1. Operant Level. During OL, Ss received 20 trials. Each trial consisted of the successive presentation of the 100 cards each at a 10-sec. rate. The S constructed one sentence during the 10-sec. exposure. At the end of the presentation period, E removed the top card from the deck, and the next one appeared. No card in the deck appeared

more than once for any S. The deck was shuffled prior to S's entry into the experimental room.

The E kept a cumulative record of each S's use of each pronoun during OL trials. At the completion of OL, the four pronouns were ranked for each S with respect to the number of times each was used in the sentence-completion task. The most frequently used pronoun was given a rank of 1, and the least frequent pronoun a rank of 4. In case of ties, ranking was determined by the flip of a coin. The E and S did not converse during OL trials.

2. Conditioning (Cond). Immediately after the completion of OL, 40 Cond trials were given. Although a total of five groups received verbal reinforcement, the groups differed from one another in terms of (a) number of pronouns reinforced (one or two), and (b) initial OL of the pronouns reinforced (1-4).

Under the one pronoun condition, one group was verbally reinforced for the use of the pronoun with the highest (1) initial response preference during OL, while a second group was reinforced for the use of the lowest (4) ranked pronoun. Under the two pronoun condition, each of three groups was reinforced for using either the two highest (1,2), the two lowest (3,4) or the highest and lowest ranked pronouns (1,4). For all groups, appropriate verbal reinforcement was given at the completion of each sentence-completion trial. Every attempt was made by E to give the verbal reinforcement in a

warm, uniform manner for all Ss.

Each of the above five reinforced groups was further divided into a Varied (V) and Fixed (F) reinforcement subgroup of 8 Ss each. For Ss in the V subgroup, four reinforcement words (good, okay, all right, that's fine) were used with approximately equal frequency across the 40 Cond trials. For Ss under the F condition, only one reinforcement word was used for each S, with one-quarter of the Ss (2) in each F subgroup receiving each of the four reinforcement words. The sixth (Control) group received no verbal reinforcement, and hence was treated as it had been during OL trials.

3. Extinction (Ext). The 40 Cond trials were immediately followed by 40 Ext trials, in which no verbal reinforcement was given for previously reinforced responses. The Ss in the Control group were treated as they had been during OL and Cond. The Ss in the F-V reinforcement subgroups were subdivided further into a Terminal (T) and Different (D) reinforcement group of 4 Ss each. For the T subgroup, all verbal reinforcement was withheld during the Ext trials. The Ss in the D subgroup continued to receive verbal reinforcement on Ext trials, but this was contingent upon the emission of a response exactly opposite to that reinforced during Cond trials. For example, if the reinforced response during Cond was 1, then 4 was reinforced during Ext. If Ss were previously reinforced for both 3

and 4 during Cond, then 1 and 2 were reinforced during Ext.

Post-experimental interview. At the completion of Ext, E questioned each S to ascertain whether or not she suspected what the purpose of the experiment had been and/or whether she was able to verbalize the reinforcement and its contingency (i.e., the specific pronoun(s)). Two such Ss were identified, and their results were excluded from all analyses. Two replacements were obtained and their results were substituted in the analysis.

## RESULTS

The number of times each of the four pronouns was used, the dependent variable, was tabulated separately for each S for OL, Cond, and Ext.

### Operant Level

In order to determine if the six groups displayed similar initial response tendencies, the mean number of OL responses for each pronoun was tabulated separately for each group. These data are presented in Table 1. As required by the ranking procedure employed, mean number of responses decreased progressively from Pronoun 1 through 4. The differences among the four pronouns were found to be statistically significant by analysis of variance beyond the .05 level, the minimal criterion of significance for all analyses to be reported,  $F(3,270) = 242.68$ . Thus, these results indicate a clear differentiation in OL for the four pronouns. However, pattern of responding (i.e., relative frequency of usage of each pronoun) was not found to vary differentially for the six groups, as indicated by a non-significant Pronoun x Groups interaction,  $F(15,270) = 1.14$ . Therefore, it may be assumed that differences among the pronouns in frequency of usage were similar for all groups.

Further analysis, presented in Appendix 2, showed all interactions involving F-V, T-D, and Groups (excluding the



Table 1

Mean number of responses for each Pronoun by each Group during OL trials.

Groups	Pronouns			
	1	2	3	4
1	14.8	10.6	8.5	6.1
4	16.6	11.4	7.0	5.0
1,2	15.0	11.5	8.0	5.4
3,4	16.8	11.0	8.4	3.9
1,4	16.3	11.9	7.3	4.6
Control	16.1	11.1	8.1	4.6
Total	15.9	11.3	7.9	4.9

Control group) to be nonsignificant (all  $F$ 's  $\leq 1.60$ ). It should be noted that for this analysis, these represent "dummy" variables since no differential treatments as yet had been applied.

### Conditioning

Table 2 presents the mean number of responses for each pronoun made by the Control and various F-V subgroups. As during OL, overall difference in frequency of responding for the four pronouns differed significantly,  $F(3,270) = 30.47$ . Also in agreement with the results of OL, the differences between the four pronouns again appeared to be comparable across the six basic groups; the Pronoun x Groups interaction fell far short of significance,  $F(15,270) = 1.49$ . The results of additional analyses summarized in Table 3 show overall differences between F-V and the interaction of this with all other variables to be nonsignificant.

In order to determine any change in response pattern from OL to Cond for the various experimental conditions, an analysis of variance also was performed on the combined OL and Cond data. The results are presented in Table 4. Of particular interest are the significant OL-Cond x Pronoun and Pronoun x Groups interactions. As can be seen from Figure 1, which shows the mean number of responses for each of the four pronouns on both OL and Cond, the Pronoun x OL-Cond interaction appears to be a consequence of the tendency for Pronouns 1 and 2 to decrease and for Pronouns 3

Table 2

Mean number of responses made for each Pronoun by Groups and Subgroups during Conditioning.

Groups	Sub-groups	Pronouns			
		1	2	3	4
1	Fixed	11.3	9.3	10.6	8.9
	Varied	14.9	7.5	9.6	8.0
	Total	13.0	8.4	10.1	8.4
4	Fixed	14.5	9.5	8.9	7.1
	Varied	13.6	9.5	8.8	8.1
	Total	14.0	9.5	8.8	7.6
1,2	Fixed	14.8	8.4	9.6	7.3
	Varied	12.5	9.5	10.6	7.4
	Total	13.6	8.9	10.1	7.3
3,4	Fixed	9.5	11.4	12.0	7.1
	Varied	13.5	8.8	10.0	7.8
	Total	11.5	10.0	11.0	7.4
1,4	Fixed	13.4	11.3	8.1	7.3
	Varied	15.4	7.9	10.9	5.9
	Total	14.4	9.6	9.5	6.6
Control		12.6	11.9	7.3	8.3
Total <sup>#</sup>		13.3	9.3	9.9	7.5
Total <sup>/</sup>		13.2	9.7	9.5	7.6

<sup>#</sup>Mean computed without the control group.

<sup>/</sup>Mean computed with the control group.

Table 3

Analysis of variance summary table for Conditioning on the mean number of responses by Fixed-Varied Subgroups (without the control group).

Source	df	Mean Square	<u>F</u> Ratio
Total	319		
Between <u>Ss</u>	79		
Within <u>Ss</u>	240		
Pronouns (P)	3	478.575	28.21*
P x Groups (G)	12	15.033	<1
P x Fixed-Varied (F-V)	3	23.142	1.36
P x G x F-V	12	20.621	1.22
Error	210	16.967	

Note.-Since all groups necessarily produced the same total number of responses, no Between S effects exist.

\* Significant at or beyond the .05 level.

Table 4

Analysis of variance summary table based on Operant Level and Conditioning combined.

Source	df	Mean Square	<u>F</u> Ratio
Total	767		
Between <u>Ss</u>	95		
Within <u>Ss</u>	672		
OL-Cond (T)	1	0.000	
Pronouns (P)	3	2341.295	211.14*
T x Groups (G)	5	0.000	
P x G	15	19.641	1.77*
T x P	3	309.670	27.93*
T x P x G	15	15.774	1.42
Error	630	11.089	

Note.-Since all groups necessarily produced the same total number of responses, no Between S effects exist.

\* Significant at or beyond the .05 level.



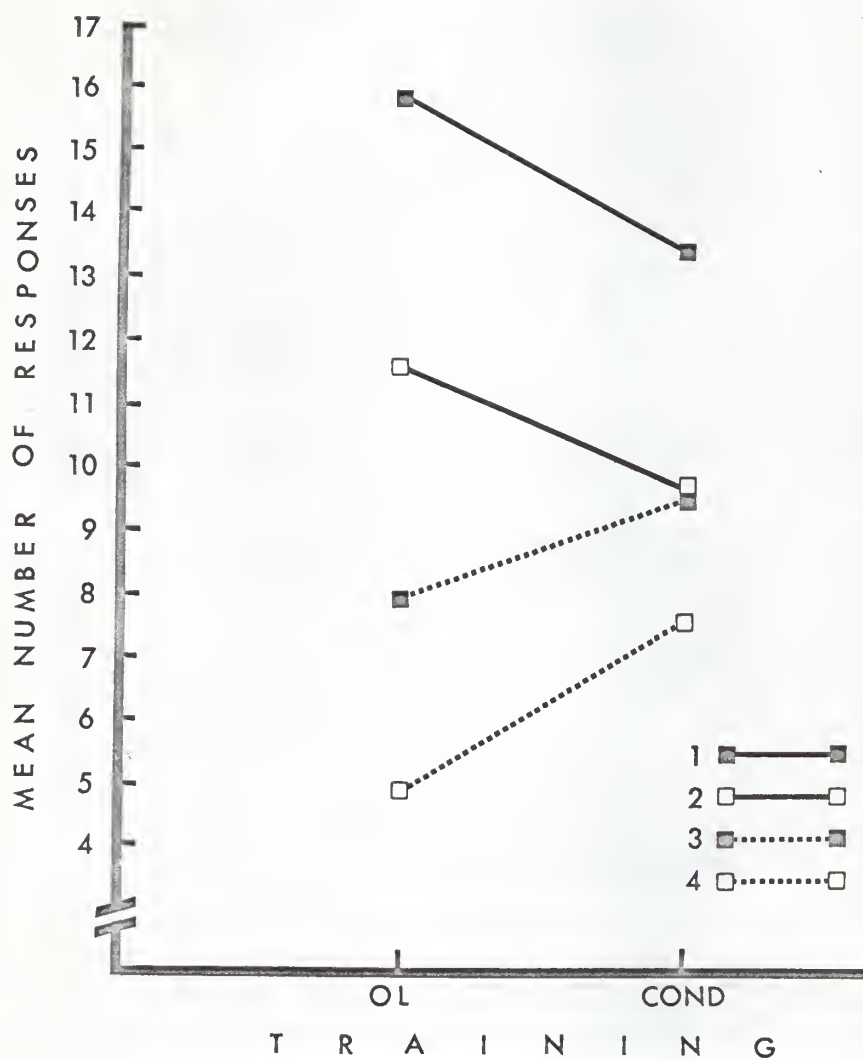


Figure 1. Mean number of responses for Pronouns 1-4 emitted during Operant Level and Conditioning.

and 4 to increase in usage from OL to Cond. Inspection of the last ten OL trials and the first ten Cond trials indicated the convergence to be fairly gradual; no abrupt changes in responding were observed at the onset of Cond. Presented in Figure 2 are the mean number of responses for each of the four pronouns made by each of the six groups, combined across OL and Cond. The Pronoun x Groups interaction seems primarily attributable to the nearly comparable performance on Pronouns 2 and 3 for Groups 1, 1-2, and 3-4, as compared with the considerably poorer performance on 3 than 2 for Groups 4, 1-4, and C. Thus, this difference in responding for Pronouns 2 and 3 does not appear to be systematic with respect to the variables directly manipulated.

### Extinction

Table 5 shows the mean number of responses made under each experimental condition during extinction. When comparisons are made including Group C, there was an overall significant difference between Pronouns,  $F(3, 270) = 13.96$ , as was found also during OL and Cond, but the Pronoun x Groups interaction still fell far short of significance ( $F < 1$ ). Moreover, the usage of pronouns does not appear to vary systematically as a function either of F-V or T-D conditions; all interactions involving F-V, T-D, Pronouns, and Groups were nonsignificant (all  $F$ 's  $\leq 1.19$ ).

The results of comparisons based upon the combined Cond and Ext data revealed only the overall Pronoun effect and

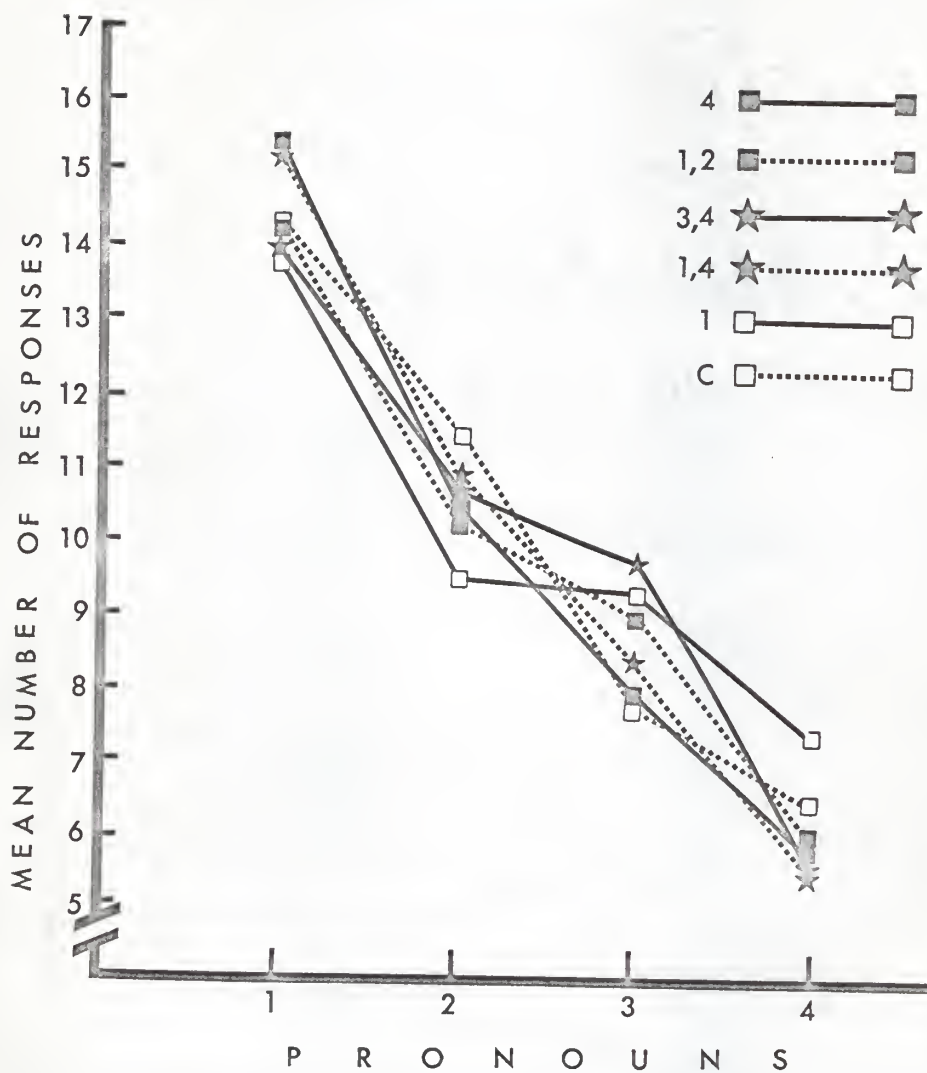


Figure 2. Mean number of responses for Pronouns 1-4 combined across Operant Level and Conditioning under each of the six Groups.

Table 5

Mean number of responses for each Pronoun by Groups and Subgroups during Extinction.

Group	Sub-group	Pronouns							
		1		2		3		4	
		T	D	T	D	T	D	T	D
1	F	12.5	10.0	10.0	8.5	9.3	13.5	8.3	8.0
	V	12.3	12.3	8.8	10.0	9.8	10.0	9.3	7.8
Total		(11.8)		(9.3)		(10.6)		(8.3)	
4	F	12.5	13.3	10.5	9.3	9.0	9.8	8.0	7.8
	V	13.5	16.5	10.0	9.3	9.3	8.5	7.3	5.8
Total		(13.9)		(9.8)		(9.1)		(7.2)	
1,2	F	12.8	12.0	10.3	10.5	9.3	9.8	7.8	7.8
	V	12.3	10.5	9.0	10.8	11.0	10.5	7.8	8.3
Total		(11.9)		(10.1)		(10.1)		(7.9)	
3,4	F	11.5	9.3	6.5	12.5	12.3	11.8	9.8	6.5
	V	12.0	16.8	10.0	8.0	10.0	7.5	8.0	7.8
Total		(12.4)		(9.3)		(10.4)		(8.0)	
1,4	F	10.3	12.8	14.5	7.0	7.5	9.8	7.8	10.5
	V	15.0	13.3	9.8	7.3	8.8	12.3	6.5	7.3
Total		(12.8)		(9.6)		(9.6)		(8.0)	
Control		11.2		11.4		8.8		8.6	
Total#		12.5	12.7	9.9	9.3	9.6	10.3	8.0	7.7
Total/		12.3		9.9		9.8		7.9	

# Mean computed without the control group.

/ Mean computed with the control group.

the interaction of this variable with Groups to be significant,  $F(3,630) = 48.51$  and  $F(15,630) = 1.85$ , respectively. All other interactions were not significant (all  $F$ 's  $< 1$ ). Figure 3 depicts the mean number of responses for each of the four pronouns under each of the six groups. As can be seen, the significant Pronoun x Groups interaction primarily reflects the relatively large difference between Pronouns 2 and 3, for Group C, as compared with all other groups.

Additional analyses of F-V and T-D conditions on combined Cond and Ext performance are summarized in Table 6. The finding of a significant Pronoun x F-V interaction was highly unsystematic and defied simple interpretation. All other interactions were not significant. Furthermore, inspection of the means of the four kinds of verbal reinforcers used in the V group showed no apparent differential effect of these on responding.

Since the number of responses for each of the four pronouns for each S during OL trials had been recorded, it also was possible to rank Ss within each of the six groups on the basis of an OL preference. Specifically, OL preference scores were obtained for each S by subtracting the number of responses for Pronoun 1 from Pronoun 4. Within each group, Ss were ranked from largest to smallest on the basis of this difference score. The eight Ss with the largest scores were designated Strong and the others Weak OL preference Ss. In the case of ties, Ss were assigned by the



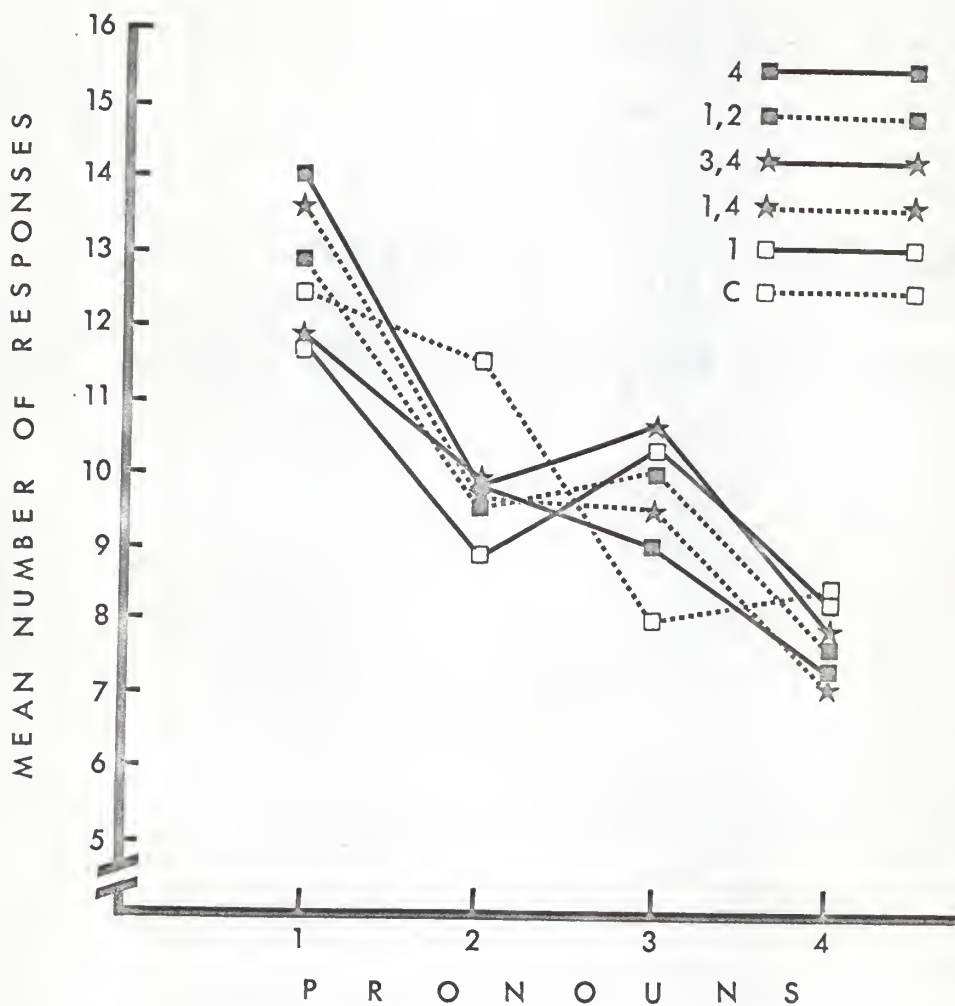


Figure 3. Mean number of responses for Pronouns 1-4 combined across Conditioning and Extinction under each of the six Groups.

Table 6

Analysis of variance summary table based on Conditioning and Extinction combined.

Source	df	Mean Square	F Ratio
Within	560		
Cond-Ext (T)	1	0.000	
Pronouns (P)	3	764.850	46.49*
T x Groups (G)	4	0.000	
T x P	3	11.583	<1
T x P x G	12	6.885	<1
T x Fixed-Varied (F-V)	1	0.000	
T x Terminal-Different (T-D)	1	0.000	
T x G x F-V	4	0.000	
T x G x T-D	4	0.000	
T x F-V x T-D	1	0.000	
P x G	12	15.902	<1
P x F-V	3	46.517	2.83*
P x T-D	3	9.083	<1
P x G x F-V	12	28.017	1.70
P x G x T-D	12	28.417	1.73
P x F-V x T-D	3	17.250	1.05
T x P x F-V	3	4.100	<1
T x P x T-D	3	11.367	<1
Residual	475	16.453	

Note.-Since all groups necessarily produced the same total number of responses, no Between S effects exist.

\* Significant at or beyond the .05 level.

flip of a coin. The rationale for this dichotomy is that relatively large difference scores indicate a pronounced preference for certain responses, while small differences suggest indifference. A plot of the means of these data, however, failed to reveal differential response tendencies for the six groups during OL, Cond, or Ext. Thus, the identification of Ss on the basis of OL preference provided no additional insight into the failure of the experimental conditions to exert their influence.

## DISCUSSION

The findings of the present study fail to provide empirical support for the notion of differential conditioning due to operant level, number of pronouns reinforced, Fixed versus Varied reinforcers, or verbal reinforcement during extinction (Terminal-Different). However, the research does suggest several relevant issues.

An interesting and perhaps important finding of the present study was the demonstration of a gradual convergence of the most and least preferred responses across operant level and conditioning trials. This finding seems to suggest a "regression toward the mean" which appears to be highly independent of the specific experimental manipulations of the present study. A similar phenomenon also has been reported by Hartman (1955). However, the fact that no reinforcement Ss did not show a similar convergence for Pronouns 2 and 3 indicates that reinforcement per se may facilitate the regression effect in the middle range of OL. Thus, it would appear that with high OL response(s), reinforcement must exert enough influence to overcome the tendency to decrease level of responding, while with low OL response(s), the effect of positive reinforcement is inevitably confounded with the existing tendency to increase level of responding. Again, the importance of a suitable control is paramount, since the effect of reinforcement can only be determined accurately in the presence of such a control group. Because

of the gradual nature of the convergence of extreme responses, which started slightly before the end of the twentieth operant level trial and which continued up to the tenth conditioning trial, the reliability of operant level estimation based on 20 trials might be questioned. It is suggested that perhaps 30 or more non-reinforced trials may be needed to accurately establish the operant level.

The question may be raised as to why conditioning did not occur under the conditions of the present investigation. The failure to find conditioning has not been uncommon (Ball, 1952; Dally, 1953; Getter, 1963; Hartman, 1955; Marion, 1956; Matarazzo, Saslow, & Pareis, 1960; Solly & Long, 1958; Taffel, 1955). In some cases (Ball, 1952; Taffel, 1955), the failure to obtain conditioning appeared to result from using a mechanical (light or buzzer) reinforcer, whereas in other instances (Dally, 1953; Marion, 1956), researchers failed to obtain conditioning using verbal reinforcers. Moreover, some studies have failed to demonstrate conditioning of verbal behavior apparently because of operant level. Getter (1963), Hartman (1955), and Matarazzo, Saslow, & Pareis (1960) found Ss with a high operant level response class resistant to the effects of verbal reinforcement, and from research in this laboratory and the investigation by Wilson & Verplanck (1956), the low operant level response class was found not to condition. Finally, Solly & Long (1958) concluded that the pre-experimental treatment of Ss



was an important variable determining the effectiveness of the reinforcer, with Ss who were acclimated to the experimental session exhibiting conditioning, while those who were not acclimated demonstrating significantly inferior conditioning.

The results of the above-mentioned studies suggest that researchers have not yet identified some important variables which determine the performance of Ss in the verbal conditioning experiment. The lack of effective control of relevant but unknown variables for verbal conditioning may account for the failure to obtain conditioning or differential response tendencies in the present study.

On the other hand, because of the attempts to implement the findings of past research in controlling for such factors as type of reinforcing stimuli, operant level, and pre-experimental treatment of Ss, it is possible that experimental restrictions prevented the reinforcement from being effective. It should be remembered that E sat behind a screen throughout the duration of the experiment in an attempt to minimize incidental gestures and facial movements which might have served as effective cues for the Ss. However, the removal of E from S's visual field also served to minimize E and S interaction, which has been demonstrated to play an important role in the verbal conditioning experiment (Kanfer & Karas, 1959; Sopolsky, 1960); verbal reinforcement is essentially a social phenomenon. Thus,

the female Ss were placed perhaps in a situation in which they were unmotivated to discriminate relevant cues, and hence the effectiveness of the verbal reinforcement may have been minimized or completely eliminated. Such an interpretation is supported by the finding that none of the reinforced groups, relative to the control, gave evidence of conditioning or systematic alteration of response tendencies. It seems clear that future research must establish an effective reinforcing stimulus to produce verbal conditioning in order to assess adequately the differential effect of operant level on conditioning and extinction. If the reinforcement is to be a verbal one delivered by E, then the E-S relationship may have to be examined in detail, since mere verbal exclamations of approval may be inadequate to produce conditioning. Certain mechanical reinforcers have been effectively utilized (Greenspoon, 1951; McNair, 1957) and should also be considered for inclusion in future research.

The present study provided a new way of evaluating the effects of operant level on verbal conditioning, by defining operant level in terms of S's actual preference. Although the results of the present study do not support the significance of this variable, it should be remembered that none of the other experimental variables demonstrated a significant and systematic differential influence. Future research which may attempt to study the effects of operant

level can take into account an additional variable which may be of importance for verbal conditioning. In addition, the analysis and results reported here suggest the following requirements as basic to the study of verbal conditioning:

(1) that an extinction phase be included, (2) that each experimental group should have an appropriate control group which does not receive reinforcement for the duration of the experiment, so that comparisons may be made between reinforced and non-reinforced groups over all trials, and (3) that use be made of at least two levels of OL in order to be able to ascertain any differential effect of operant level on conditioning and extinction.

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## APPENDIX 1

Listing of 100 verbs taken from Klein (1954) and Taffel (1955).

CALLED	SNIPPED	DRESSED
WEIGHED	PUT	LABORED
TALKED	PICKED	FLOWED
ATE	FIXED	WENT
FINISHED	MADE	WROTE
FISHED	SAID	JUMPED
TOLD	SAT	HIT
LIKED	CHEWED	POINTED
OPENED	LISTENED	PLOWED
HOPED	PREPARED	KNEW
DREAMED	CARRIED	RECEIVED
STARTED	BEGAN	WALKED
THREW	DRAGGED	KEPT
HEATED	WORKED	DANCED
ENJOYED	GROUND	HURT
DROVE	SWAM	STOOD
LOST	HID	WIPED
HELPED	BROKE	PLAYED
RAN	RESTED	CAME
SHUT	WASHED	REAPED
JOINED	CLEANED	MISSED
DREW	SAW	CHOSE
RESISTED	FILLED	LIVED
HIKED	NOTICED	LAUGHED
HUNTED	REMEMBERED	TAPPED
PHONED	ROWED	ACTED
SLEPT	BROUGHT	LOANED
GOT	STRUCK	PLANTED
COMPLAINED	ADDED	RELAXED
LEFT	CUT	TURNED
FURNISHED	TRIED	NEEDED
INSTALLED	SANG	WATCHED
LIT	DRANK	HEARD
		FOUND

## APPENDIX 2

Analysis of variance summary table for OL on the mean number of responses made by each Fixed-Varied and Terminal-Different Subgroup.

Source	df	Mean Square	<u>F</u> Ratio
Total	319		
Between <u>Ss</u>	79		
Within <u>Ss</u>	240		
Pronouns (P)	3	1751.808	197.26*
P x Groups (G)	12	12.142	1.37
P x Fixed-Varied (F-V)	3	6.542	<1
P x Terminal-Different (T-D)	3	4.775	<1
P x G x F-V	12	7.167	<1
P x G x T-D	12	14.233	1.60
P x F-V x T-D	3	3.042	<1
P x G x F-V x T-D	12	10.208	1.15
Error	180	8.881	

Note.-Since all groups necessarily produced the same total number of responses, no Between S effects exist.

\* Significant at or beyond the .05 level.



VERBAL CONDITIONING AND EXTINCTION AS A FUNCTION OF  
OPERANT LEVEL, NUMBER OF VERBAL RESPONSES, AND  
TYPE OF REINFORCEMENT

by

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Previous research in verbal conditioning has typically compared the level of verbal responding for reinforced trials with that for non-reinforced trials (i.e., operant level) as a means of determining the effectiveness of reinforcement in verbal conditioning. The use of such a procedure, however, does not allow for unambiguous interpretation of the results because changes in the level of verbal responding after reinforcement may also reflect other systematic sources of variability across reinforcement trials. One purpose of the present research was to establish a more sensitive test of verbal conditioning by including a control group which received no reinforcement for the duration of the experiment.

Past research has also been concerned with the effect on verbal conditioning of differences in operant level of the to-be-reinforced verbal response. For the most part, operant level has been defined by the experimenter on a priori grounds (e.g., frequency of usage in the English language) rather than on the basis of the subject's (S's) actual usage during the experimental task prior to reinforcement trials. Thus, a second major purpose of this investigation was to determine empirically the effect on verbal conditioning of variations in operant level, when such levels are defined in terms of S's actual pre-reinforcement performance. In addition, the present study compared the performance of Ss receiving just a single reinforcer (i.e.,

"good") with those receiving several different reinforcers (i.e., "good", "okay", "that's fine", "all right").

Ninety-six female introductory psychology students at Kansas State University served as Ss. The experimental task was to construct a sentence using a verb and one of four pronouns printed on a 4 x 6 in. card. Each such sentence constituted a trial. Operant level (OL) for each pronoun for each S was determined during the first 20 trials, during which no reinforcement was given. At the end of the OL trials, Ss were assigned randomly to one of six reinforcement conditions and were given 40 conditioning trials. During conditioning, five of the groups received verbal reinforcement for using the pronoun for which they had (1) the highest OL, (2) the lowest OL, (3) the two highest OLs, (4) the two lowest OLs, and (5) the highest and lowest OL. Each of the five reinforced groups was further subdivided into fixed (a single verbal reinforcer) and varied (several different reinforcers) subgroups of 8 Ss each. The sixth group was a control which received no reinforcement throughout the experiment.

Following the conditioning trials, 40 extinction trials were given. For half of the Ss in each subgroup, reinforcement was terminated. For the other half, the reinforcement was shifted to a previously non-reinforced pronoun (or to two pronouns if two had been reinforced). As noted, the control group continued without reinforcement.

The results indicated little, if any, systematic effect of the variables under investigation. When considered across operant level and conditioning trials, the level of verbal responding did not vary significantly as a function of the operant level, number of responses, or type of reinforcement. Extinction similarly showed no differences. Thus, no verbal conditioning or differential responding was evident as a function of the variables manipulated. However, a consistent finding was that of a gradual convergence in level of responding for high and low operant level pronouns over operant level and conditioning trials. This convergence continued through the extinction trials.

Several explanations were offered to account for the failure of the present investigation to find conditioning. One important interpretation was that the verbal reinforcement may have been rendered ineffective by the rather stringent restrictions on social interaction imposed by the chosen experimental controls. The need for identifying and controlling relevant but as yet unknown variables was strongly suggested. In addition, the research points to the need for future investigators to recognize the existence and importance of systematic changes in responding in the absence of reinforcement, particularly for extreme operant level responses.